

EARLY STAGES OF THE TRAVANCORE EVENING BROWN *PARANTIRRHOEA MARSHALLI* WOOD-MASON (SATYRINAE, NYMPHALIDAE, LEPIDOPTERA), AN ENDEMIC BUTTERFLY FROM THE SOUTHERN WESTERN GHATS, INDIA

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Descriptions of hitherto unknown early stages of the Travancore Evening Brown *Parantirrhoea marshalli* Wood-Mason, a rare and endemic butterfly from the southern Western Ghats are presented. *Ochlandra travancorica* Benth., Family Poaceae, a gregarious reed seen near water in deciduous and mixed forests, is reported as its larval host plant for the first time. Even though the caterpillars of this species were found to be common in suitable habitats, the adults were rarely sighted in its range.

Key words: early stages, endemic species, Travancore Evening Brown, *Parantirrhoea marshalli*, Satyrinae, Nymphalidae, Lepidoptera, Western Ghats

INTRODUCTION

Travancore Evening Brown *Parantirrhoea marshalli* was first described in 1880 by J. Wood-Mason in *The Journal of Asiatic Society*, Bengal. Marshall and de Niceville (1883) stated, “*P. marshalli* has yet only been found in Travancore, where it was discovered by Mr. H.S. Ferguson on the Ashambo hills in May.” More than 100 years have passed with only a handful of sightings of this elusive butterfly.

Parantirrhoea marshalli is endemic to the southern Western Ghats of peninsular India and is known to occur from Coorg to the Ashambu hills. This species could be described as an entomologic curiosity because it's nearest related genus *Antirrhoea* is found flying only in the South American jungles. Both these genera are remarkable for the peculiar arrangement of hindmost veins of the anterior wings. Here, the first median veinlet runs back to the inner angle and the submedian vein ends a considerable distance short of that angle.

The species had not been reported since its last sighting by Fraser in 1930 till Elamon (1993) rediscovered a population of *P. marshalli* in the environs of the Periyar Tiger Reserve in Kerala. Recently, Kunhikrishnan (2002) reported sightings of this butterfly in the southern region of the Western Ghats. Although both sexes of this butterfly have been photographed, not much information is available on the early stages of this butterfly.

A number of authors have written about the perfect form of this species; but the only mention of its suspected host plants and early stages are in Fraser (1930), Yates (1931), and Wynter-Blyth (1957), Gaonkar (1996). Fraser (1930) mentioned that the larva of *P. marshalli* feeds on ‘cane’. Yates (1930) enquired, through the *Journal of the Bombay Natural*

History Society, if what Fraser (1930) meant by ‘cane’ was *Ochlandra rheedii* Benth. & Hook.f. ex Gamble, and asked him to describe the larva if he had found it.

Wynter-Blyth (1957) quoted Yates in his work BUTTERFLIES OF THE INDIAN REGION and suspected that the food plant was *Ochlandra rheedii* (Syn: *Ochlandra scriptoria* Dennst.), as it was always in its clumps that Yates had found it. Gaonkar (1996) stated that the bamboo *Ochlandra scriptoria* Dennst. could be a probable larval host plant for *P. marshalli* and the species was invariably found wherever this plant was available.

METHODOLOGY

This study was conducted in the Kallar-Ponmudi valley (8° 60'-8° 79' N; 77° 07'-77° 20' E); a northerly extension of the Ashambu hills of southern Western Ghats in Trivandrum district of Kerala state in southern India (Fig. 1).

The climate of the area is best described as tropical monsoon type. The mean annual rainfall, from the South-west Monsoon (May to July) and North-east Monsoon (October to November), is around 3,000 mm. The dry months of the year are from January to May. The maximum summer temperature is 35 °C and minimum winter temperature is 16 °C.

The larvae collected from field were reared under laboratory conditions from January to August 2006. 18 larvae were reared to final instar larvae (Table 1). Caterpillars collected were reared in suitably-sized plastic containers, for example, a 3 cm long caterpillar was reared in a container 9 cm x 6 cm x 6 cm in size. Holes of 1 mm x 1 mm per sq. cm were provided for sufficient aeration and maintaining

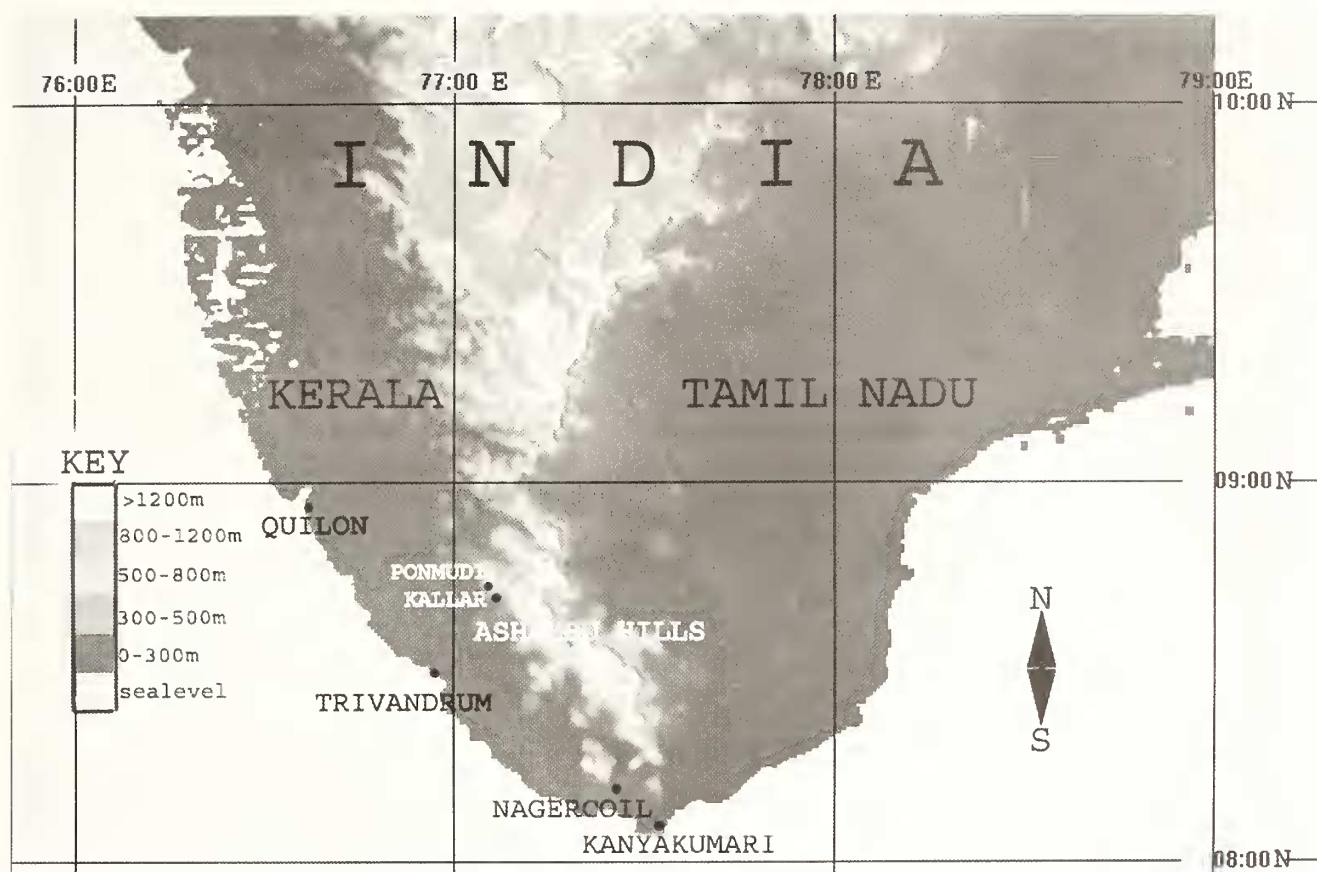


Fig. 1: Map of the study location: Kallar-Ponmudi region in Southern Western Ghats of southern India

appropriate humidity. The container was cleaned and fresh leaves were added every day. Biometric data was obtained with Vernier callipers.

For description of larvae, we have followed Bell (1909). We have described the stage before the first moult as newly hatched larva. The area between the sub-dorsal and dorso-lateral aspects of the larvae are described here as paradorsal

Table 1: Details of the larvae found and reared of *Parantirrhoea marshalli* Wood-Mason 1880 (January to July 2006, N=18)

S.No.	Month and year	Number of larvae per leaf observed in field	Instar
1	January 2006	1	4 th instar
2	February 2006	1	Final instar
3	March 2006	1	Final instar
4	April 2006	3	All egg larvae
5	April 2006	2	Both 4 th instar
6	June 2006	2	Both 4 th instar
7	June 2006	1	Final instar
8	July 2006	2	2 nd instar
9	July 2006	1	2 nd instar
10	July 2006	2	Both 1 st instar
11	July 2006	2	Both Final instar

region. The larvae were exacting in their needs and were difficult to rear in laboratory conditions. The adults were photographed and released into their natural habitats.

RESULTS

Parantirrhoea marshalli larvae were collected from a homestead near a large reed-break in Kallar valley in January 2006, at an altitude of less than 300 m above msl. Ferguson (1891) mentioned *P. marshalli* in his list of Travancore butterflies, and wrote that he had taken the adults from *Etah* jungle – *Bheesha travancorica* Bedd. (Syn: *Ochlandra travancorica* Benth.) in July. We collected the caterpillars from an *Etah* jungle-like habitat.

Egg: Structure unknown. Eggs were laid on the underside of the leaves almost towards the midrib, in batches of 2-4. The larvae were almost always found in small batches. On four occasions the remnants of eggshells were observed on the underside of the leaves.

Newly hatched larva: Head capsule is shiny black and shaped like in *Melanitis*, but slightly higher and without horns or other ornaments. Head capsule bears small, blackish hairs. Body is spindle-shaped and ends in a bifid tail.

The body is fluorescent yellowish-green with a tinge of yellow, especially on the dorsum. Lateral part of the body is bright leaf green. The tail is black and held at an acute angle with the substratum. The larvae on the same leaf lay huddled parallel to the midrib of the leaf. They usually fed a little away from where they lay. The general pattern of eating was peculiar. The larva lays a silk track that it follows to feed and returns to its original resting place near the midrib. The leaves are cut straight from the margin to the midrib – the primary cut, and then eaten from the side the cut was made. This pattern of foraging continued to the last instar. It was easy to locate the larvae because of their characteristic eating pattern (Fig. 2a).

First instar larva: The first instar larva is similar in structure and habits to the newly hatched larva, but differs slightly in coloration. The head and hair on it are black, except perhaps on the vertex, where there is a clear space roughly rhomboidal in shape; this bare area is greyish. The body appears more brightly coloured, and the last abdominal segment is black. The tail processes are curved upwards and always found diverging from each other (Fig. 2b). The eating patterns are similar to the newly hatched larva, and they retain the gregarious resting habits of the earlier instar.

Second instar larva: This instar is similar to the first instar larva in colour and structure, except for the head, which

is greenish-yellow with vertical stripes like in the later instars. The pair of fluorescent yellow paradorsal stripes seen in later instars is a single fused dorsal stripe in this instar. The sides of the body are pale grass green. The tail is dark brownish on the dorsal and lateral aspects. For biometric data see Table 2.

Third instar larva: This instar is similar to the second instar and differs only in coloration. The sides are pale violet with a shade of ash unlike the second instar. A dark green line borders the lateral limits of the single dorsal fluorescent line. Tail is coloured like in the previous instar, but for its black tip. Head capsule squarish, taller than broad (Fig. 2d). The larva settles under the leaf near the midrib for moulting. The duration of moulting is about 20-24 hours.

Fourth instar larva: This instar is similar in coloration to the previous instars. The single dorsal line is fluorescent yellow green (Fig. 2e). The paradorsal area is bright green and extends to the lateral aspect of the body, which is characterized by a thin pale greenish-white line bordered by a thin dark green shadow. The rest of the lateral surface is white with a pale violet tinge. The head is shaped like the final instar caterpillar.

Final instar larva: The head is triangular and vertex moderately grooved. The head is reticulo-rugose on magnification with short, down curved, long translucent green hair. The neck region and adjoining segments are

Table 2: Biometric data and duration of early stages of *Parantirrhoea marshalli* Wood-Mason 1880 from larvae reared in laboratory conditions (January to July 2006)

Stages	Duration in days	Measurements in centimeters (cm)	Remarks
Egg	Unknown	1.3 mm in diameter & 1.2 mm high	Laid in batches of 2 to 4 on undersides of reed leaf
Newly hatched larva	Unknown	Body: 0.28 - 0.5 cm	Found in twos or threes. Head black, tail bifid.
First instar	4-5 days	Head: <0.1 cm wide Body: 0.5 - 0.8 cm Tail: <0.1 cm	Pairs or triplets. Head: black with a vertical bare area, tail bifid.
Second instar	5-6 days	Head: 0.1 cm wide Body: 0.75 - 1.5 cm Tail: 0.1 cm	Pairs or triplets. Head: pale yellowish green with fluorescent greenish-yellow vertical stripe. Tail bifid.
Third instar	6-7 days	Head: 0.2 cm wide Body: 1.5 - 2 cm Tail: 0.25 - 0.3 cm	Found in pairs and triplets. Tail bifid
Fourth instar	6-7 days	Head: 0.25 cm wide & 0.3 cm high Body: 2 cm - 3.5 cm Tail: 0.4 cm long	Found in pairs. Tail bifid.
Final instar	8-10 days	Head: 0.38 wide & 0.4 cm high. Body: 4.0 cm - 5.8 cm Tail: 0.6 cm long	Found in pairs and singly. Typical features of the larvae appear. Tail almost fused into a single one. Females are larger.
Pupa	10-14 days	1.2 cm - 1.4 cm long 0.75 - 0.85 cm wide 0.4 cm wide at head	The markings on the pupae appeared similar but there was marked individual variation on closer examination. There was a mild variation in shade of the patterns.

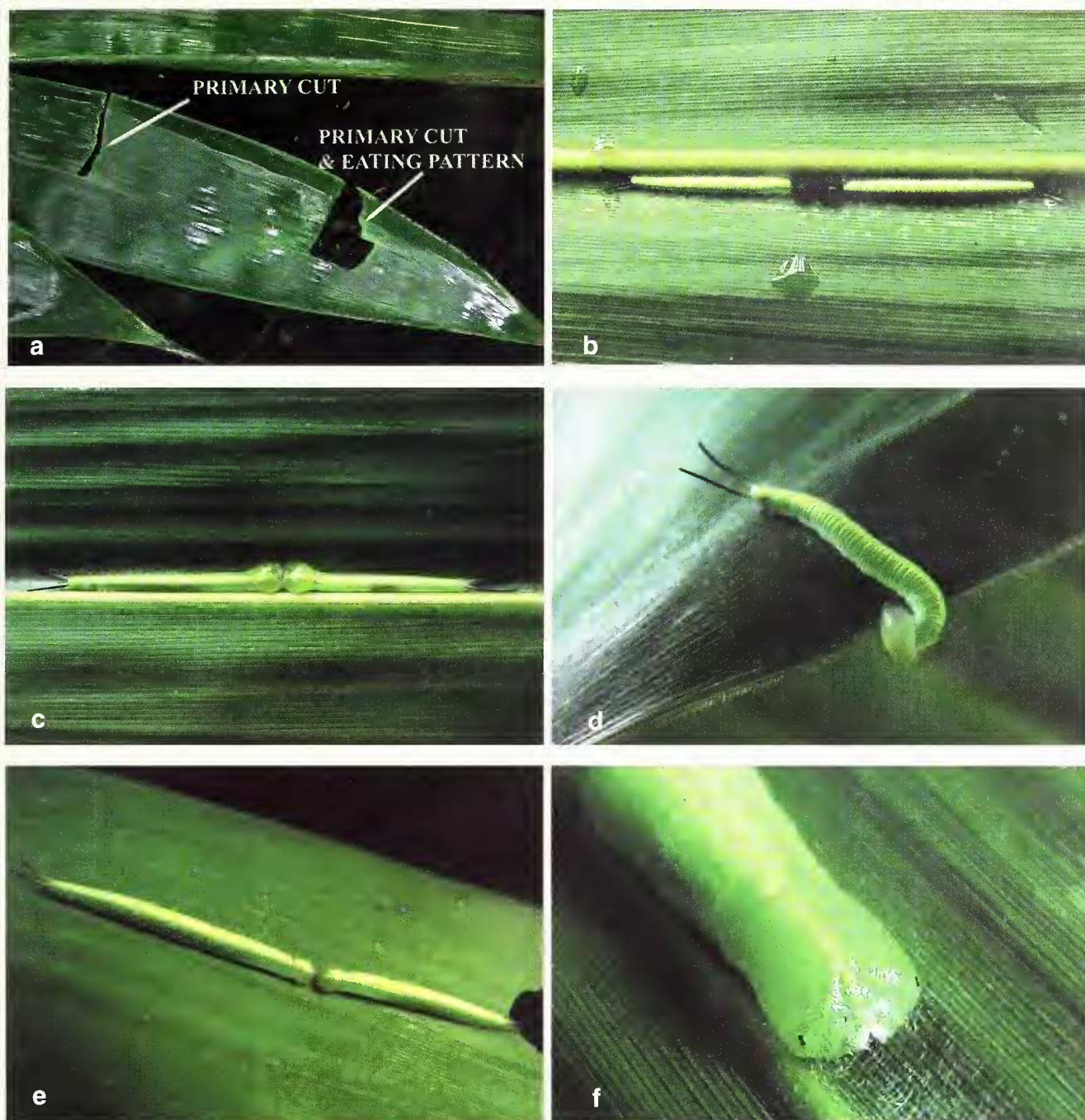


Fig. 2 (a-f): Travancore Evening Brown *Parantirrhoea marshalli*:

a. Characteristic eating pattern of the larva on *Ochlandra travancorica*; b. First instar larva; c. Second instar larva; d. Third instar larva; e. Fourth instar larva; f. Head capsule of the final instar larva

slightly narrow. The body is widest in the middle thirds. On cross-section the body was arched dorsally and the ventrum flat. On lateral view the body was tallest at about the middle then gradually tapered towards the tail. The spindle-shaped body is transversely divided by small annuli. Each segment had five annuli. In each segment proceeding from the head to tail: first the largest annuli, the second an incomplete annulus, and the rest complete annuli. Each annulus ends in

a small depression on the last lateral greenish yellow longitudinal line. This is followed by another similar depression in line with the one above. The body has extremely small hairs that are visible only when held against light. The body ends with a tail process. The base of the tail process is wide but tapers rapidly towards its tip. The two tail processes fuse into one in the final instar. However, occasionally the tip of the tail process is bifid. Though finely

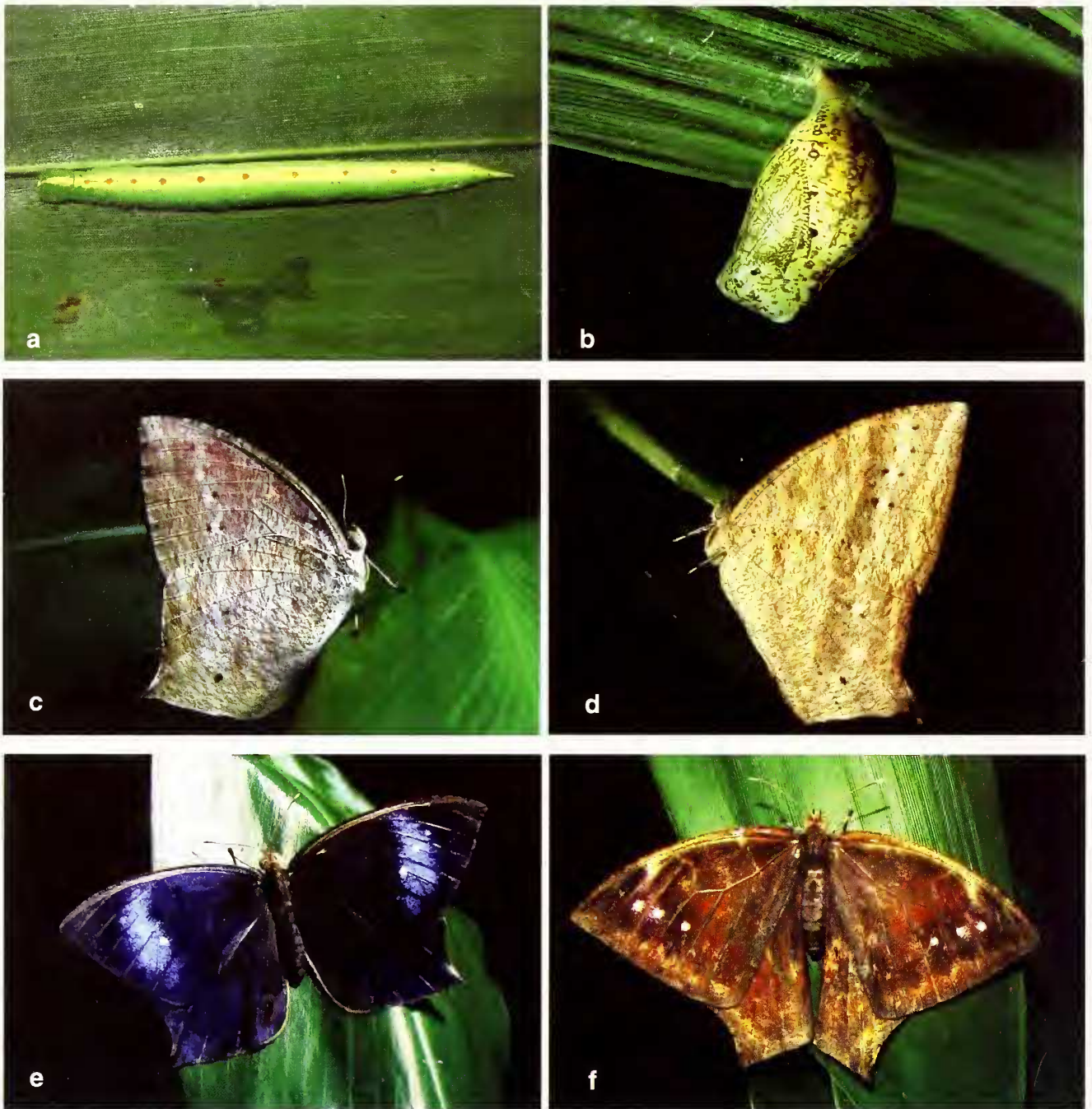


Fig. 3 (a-f): Travancore Evening Brown *Parantirrhoea marshalli*.

a. Final instar larva; b. Pupa; c. Male underside; d. Female underside; e. Male upper side; f. Female upper side

curved, it is held almost parallel to the substratum, except when it is lifted to push out the excrements. The tail process has moderately long hairs on it. The longest hair are on the head followed by tail and then the body. Spiracles are vertically oval and more or less flush with the surface. The male larvae were observed to be shorter and thinner than the female.

The ground colour of the larva is bright green. The larvae have superficial resemblance to the genus *Melanitis* and *Elymnias*. The head is waxy pale greenish yellow with a

brownish tinge. It has a bright yellow line that starts from the apex of the clypeus and passes through the vertex into the occiput. The eyes are almost black (Fig. 2f). The body has a pair of fluorescent yellowish green dorsal stripes that start just behind the occiput on the neck and run to the tail plate. In some larvae these lines are almost fused to form a single stripe from the head to tail process. Thus, the dorsal line usually starts from just above the mouth process, runs through the middle of the clypeus to reach its apex and then passes

through the dorsal groove to reach the occipital aspect of head, to continue over rest of the body. Most larvae had an orange line running through the middle of the single dorsal fluorescent line. There were twelve saffron red spots on this orangish line – a single one at the end of each segment. The last two spots were very pale and obscure (Fig. 3a). Some larvae lacked these spots and the orange line, instead the paradorsal lines were obviously separated by a dorsal-line of green.

There are three faint greenish yellow longitudinal stripes on each side, aligned parallel to the dorsal ones, running from a couple of segments just behind the neck towards the tail. These almost converge and become obscure on reaching the penultimate segment near the tail. A thick lemon yellow to whitish raised line separated the ventrum and lateral aspects. The ventrum was white laterally and translucent in the middle, revealing the ashy or gray inner contents. The tail process is orangish to brownish, except for the proximal area which is greenish, but the tips were invariably black like in previous instars. Tails of caterpillars with a dorsal red line are pale pinkish in the latter half. The larva is bright green and yellow. The sides of the body are ground coloured and infra-spiracular lines are brownish green. The larva rests on the underside of the reed leaf parallel to the midrib, almost always in company of the other larvae. The yellow dorsal line with green sides helps the larvae to camouflage with the yellow of the midrib of the reed leaf. Feeding usually takes place at night. The larvae were also observed to move to distant host plants for feeding.

Pupation: The larva settled under the leaf in open to pupate. Its colour changed to a translucent green then to a dirty waxy yellowish brown and finally to bright translucent pinkish red. The larva hung itself upside down under the leaf with its anal pro-legs. This posture was continued for about 18-20 hours; and it moved only on extreme disturbance. Pupation was completed in about 24 hours.

General shape resembled that of the Common Evening Brown *Melanitis leda* pupa, but it was smaller, compact and more angular (Fig. 3b). The ground colour of the pupa is pale waxy brownish white to rosy brown with dark brown or ash mottling, especially on the wing cases. Dorsally there is an ochreous shade, especially on the rump region in some larvae. Underside is more whitish and glazed. There is a dorsal dark stripe composed of irregular and discontinuous spots or patches, and irregular patterns. The paradorsal region also bears a similar stripe, which is lighter in coloration and is a bit more obscure in the rear thirds. The spiracular stripe is composed of closely disposed vertically oval spiracles whose circumferences were well marked by brown borders. In some spiracles this brown border is deficient in the inferior aspect. All these longitudinal stripes pass backwards, and become

obscure and disappear in the following sequence, first the paradorsal, followed by the spiracular and dorsal stripe that continue over to the dorsum of the tail process for some distance. The wing cases are marked by irregular patterns mostly ashy brown that appear running parallel to the venation. There are some ill-defined spots on these lines from which ramifications of brownish shade extend into the surrounding area between the veins. The top of the head is also marked, by irregular triangular design of a darker shade of brown. Undersides, except the wing cases, are paler and almost creamy white. There is a pair of dark spots midway between the eye rudiments and the ends of wing cases. There are three interrupted lines composed of dark brownish spots on the ventrum, two lines in lateral disposition, and last in the exact midline extending towards the tail. The male pupa is sometimes less heavily marked than the female pupa.

Duration of pupal stage was about 10-14 days and the adults (Fig. 3c-f) emerged in the late morning hours and occasionally at noon.

Parasitism and predators: None of the larvae we came across were infested with parasitoid wasps. Larval infections were also not encountered in the field. There have been instances where a recently eaten leaf with all evidences of the larval presence was vacant and the only thing we saw on it was a snail.

CONCLUSION

Information on the early stages of many endemic butterflies of the Western Ghats are still unknown. Some of the recent discoveries are of the larval stages of Golden Flitter *Quedara basiflava* (de Nicéville 1888) by Kunte (2008) and the Sitala Ace *Thoressa sitala* (de Nicéville 1885) by Kalesh and Prakash (under prep.). Observations made in this study have thrown light on the hitherto unknown early stages of the Travancore Evening Brown *Parantirrhoea marshalli* Wood-Mason and have confirmed its larval host plant for the first time. It may be recalled here that Evans (1932) has described the status of *P. marshalli* as rare. In this study it was found that the caterpillars were common during January to July, although the adult butterfly is rarely seen. They are usually seen during cloudy evenings flying amid reed clumps. It was during overcast evenings that adults were seen flying inside reed clumps. At Kallar we could observe only one or two adults after traversing about 5 km. Kunhikrishnan (pers. comm.) reported observing more than 20 adults in a walk of less than 4 km through a considerably large reed plot at Edamalar-Pooyenkutty valley, along the south-west flanks of the Anamalais in July 2003. We observed that this species is common wherever its larval host plants are available. Adults have been reported to be rare due to their peculiar habits or it

could even be due to considerable larval or pupal mortality under natural conditions.

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